Honeywell

Quick Start Guide for the **One Wireless™ Series** **WCX Series XYR 6000 Valve Position Sensor**

ISSUE 3
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⚠ WARNING
MISUSE OF DOCUMENTATION
- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING
PERSONAL INJURY
- DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING
RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE.
If sensor is to be returned to Honeywell for any reason, both batteries MUST be removed prior to shipping. Dispose of used batteries promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not dispose of in fire.

Failure to comply with these instructions could result in death or serious injury.

This document describes mounting, installation and wiring of the Honeywell OneWireless™ WCX Series valve position sensor and antennas. Configuration, authentication and operation are covered in other documents.

Honeywell does not recommend using devices for critical control where there is a single point of failure or where single points of failure could result in unsafe conditions. Honeywell OneWireless™ solutions are designed for open loop control, supervisory control, and controls that do not have environmental or safety consequences. As with any process control solution, the customer must weigh the risks and benefits to determine if the products used are suitable for the application based on security, safety, and performance. Additionally, it is up to the customer to ensure that the control strategy defaults to a safe operating condition if any crucial segment of the control solution fails.

The following list identifies all documents that may be sources of reference for material discussed in this publication.

Document Title

Getting Started with Honeywell OneWireless™ Solutions

OneWireless™ Wireless Builder User's Guide

OneWireless™ Builder Parameter Reference

OneWireless™ WCX Series XYR 6000 Valve Position Sensor User's Manual

OneWireless™ XYR 6000 Pressure Transmitter User's Manual

OneWireless™ XYR 6000 Temperature/DI Transmitter User's Manual

OneWireless™ XYR 6000 SmartCET Corrosion Transmitter User's Manual

OneWireless™ XYR 6000 HLAI Transmitter User's Manual

Symbol Definitions

The following table lists those symbols used in this document to denote certain conditions.

Symbol	Definition
	ATTENTION: Identifies information that requires special consideration.
	TIP: Identifies advice or hints for the user, often in terms of performing a task.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. **CAUTION** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	WARNING: Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death. **WARNING** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	WARNING, Risk of electrical shock: Potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 Vdc may be accessible.
	ESD HAZARD: Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices.
	Protective Earth (PE) terminal: Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	Functional earth terminal: Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national local electrical code requirements.
	Earth Ground: **Functional earth connection.** NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	Chassis Ground: Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	The Canadian Standards mark means the equipment has been tested and meets applicable standards for safety and/or performance.
	The Ex mark means the equipment complies with the requirements of the European standards that are harmonised with the 94/9/EC Directive (ATEX Directive, named after the French "ATmosphere EXplosible").
	C-Tick Mark. The C-Tick Mark is a certification trade mark registered to ACMA (Australian Communications and Media Authority) in Australia under the Trade Marks Act 1995 and to RSM in New Zealand under section 47 of the NZ Trade Marks Act. The mark is only to be used in accordance with conditions laid down by ACMA and RSM. This mark is equal to the CE Mark used in the European Union.
	Notified Body. For radio equipment used in the European Union in accordance with the R&TTE Directive, the CE Mark and the notified body (NB) identification number is used when the NB is involved in the conformity assessment procedure. The alert sign must be used when a restriction on use (output power limit by a country at certain frequencies) applies to the equipment and must follow the CE marking.

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1. Introduction

1.1 Site preparation

Wireless devices require proper site preparation to ensure optimum performance and safety compliance. Do not proceed until you have done the proper planning described in the Wireless Planning Guide.

1.2 European Union Usage

This product may be used in any of the following European Union nations.

Country	ISO 3166 2 letter code	Country	ISO 3166 2 letter code
Austria	AT	Latvia	LV
Belgium	BE	Liechtenstein	LI
Bulgaria	BG	Lithuania	LT
Cyprus	CY	Malta	MT
Czech Republic	CZ	Netherlands	NL
Denmark	DK	Norway	NO
Estonia	EE	Poland	PL
Finland	FI	Portugal	PT
France	FR	Romania	RO
Germany	DE	Slovakia	SK
Greece	GR	Slovenia	SI
Hungary	HU	Spain	ES
Iceland	IS	Sweden	SE
Ireland	IE	Switzerland	CH
Italy	IT	United Kingdom	BG

1.3 Certifications and approvals

Hazardous location certifications

Refer to product label for applicable approvals.

Approval / Item	Ratings / Description
cCSAus explosion-proof with IS outputs	CLASS I, DIV 1 GROUPS B, C, D, T6 CLASS II, DIV 1 GROUPS E, F, G CLASS III CLASS 1 ZONE 1 A/Ex d [ia] IIC T6 CLASS II ZONE 21 AEx tD [iaD] 21 T85C DIP A21 IP66 T85C Tamb -40°C to +70°C
ATEX / IEC Ex flameproof with IS outputs	Ex d [ia] IIC T6 Gb EX tb IIIC T85°C IP66/67 Db Tamb -40°C to +70°C
NEMA enclosure type	Types 1, 3, 4, 4X, 6, 6P, 13 and IP66/67
Class II and III installations and for Type 4X/IP66 applications require that all cable and unused entries be sealed with a Zone 1 certified seal fitting. Seal fittings are supplied by Honeywell.	

Radio certifications

Agency	Certification	Description
Federal Communications Commission (FCC)	DSSS FCC ID: S5750025034	The WCX Series valve position sensors comply with part 15 of the FCC rules. Operation is subject to the following two conditions. (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Industry Canada (IC)	DSSS IC ID: 573I-50025034	The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF fields in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's web site http://www.hc-sc.gc.ca/rpb

Ratings

Item	Ratings/Description	WCX
Process connections	n/a	n/a
Temperature limits	Max process temperature	n/a
	Ambient temperature limits cold:	-40 °C
	Ambient temperature limits hot:	70 °C
Entry plugs	3/4 NPT or M25	1
Field wiring (supplied by others)	Conduit (explosion proof not required)	n/a
	Cable gland	n/a

2. Sensor Mounting

2.1 Weight

Sensor model	Weight
WCX1X1... Aluminum housing & antenna	2.04 kg [4.5 lb]
WCX1X2... Bronze housing & stainless steel antenna	5.03 kg [11.1 lb]

2.2 Dimensions

Figure 1. WCX Series valve position sensor dimensions

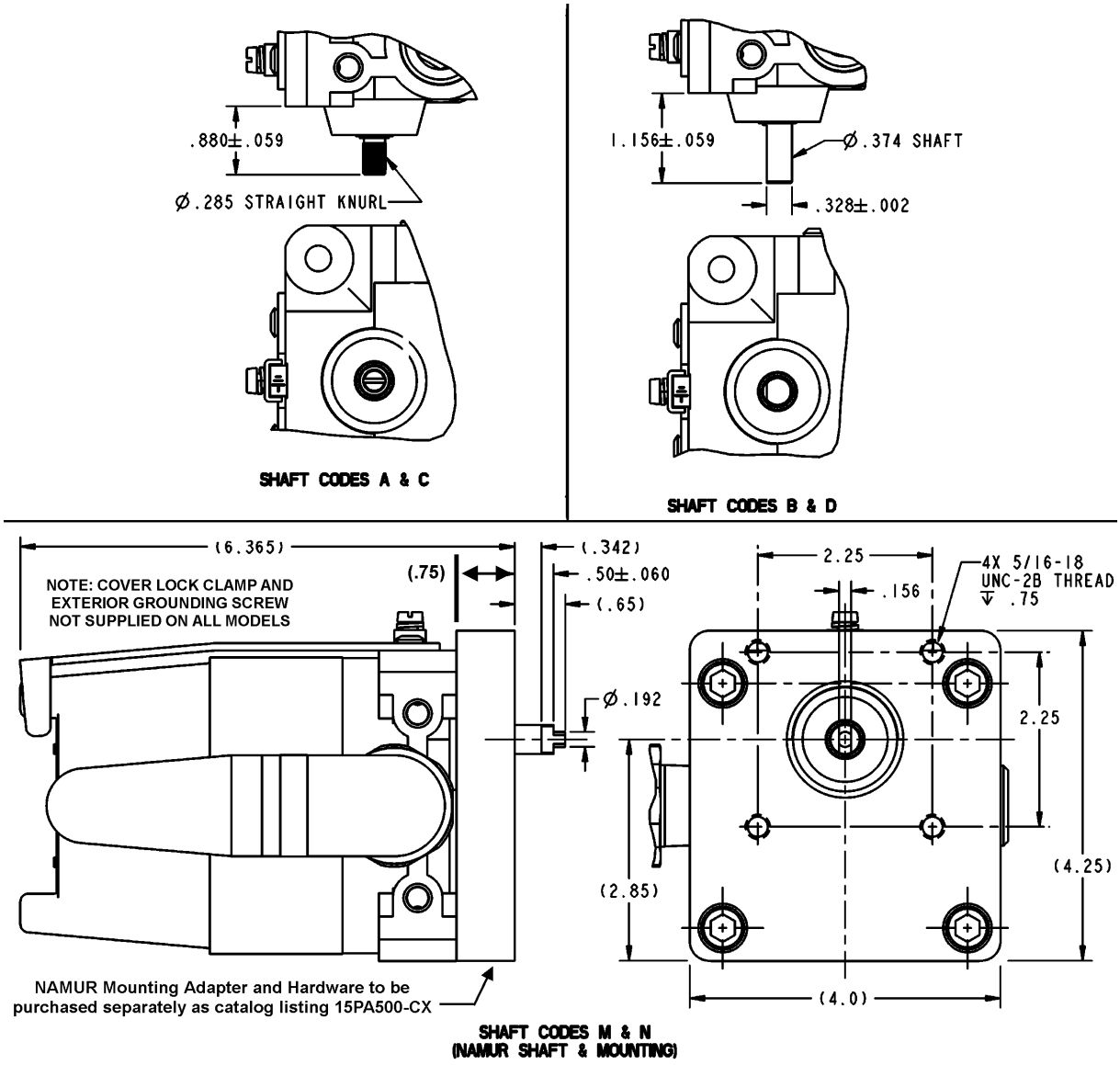


Figure 2. WCX Series valve position sensor right angle antenna dimensions

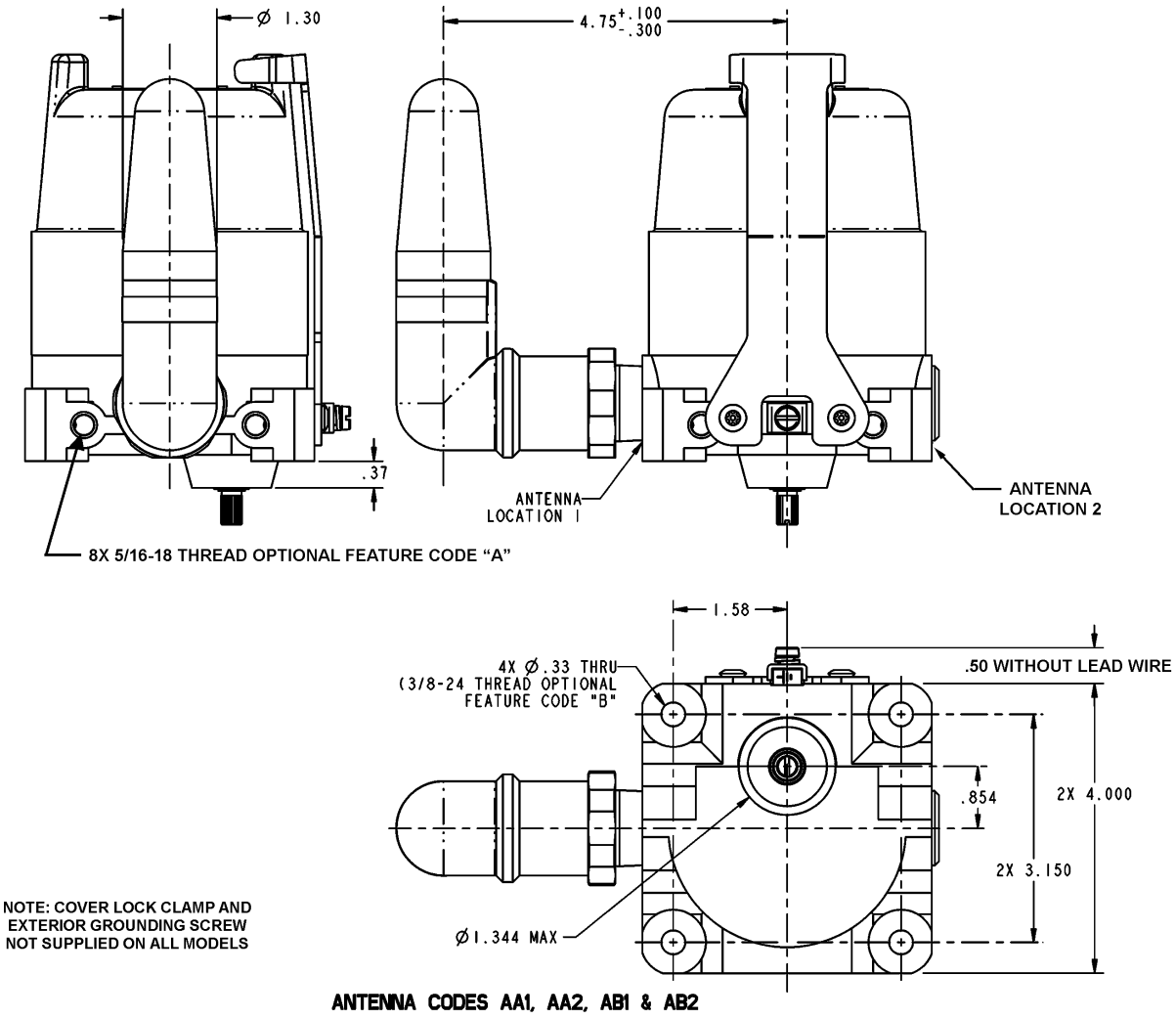
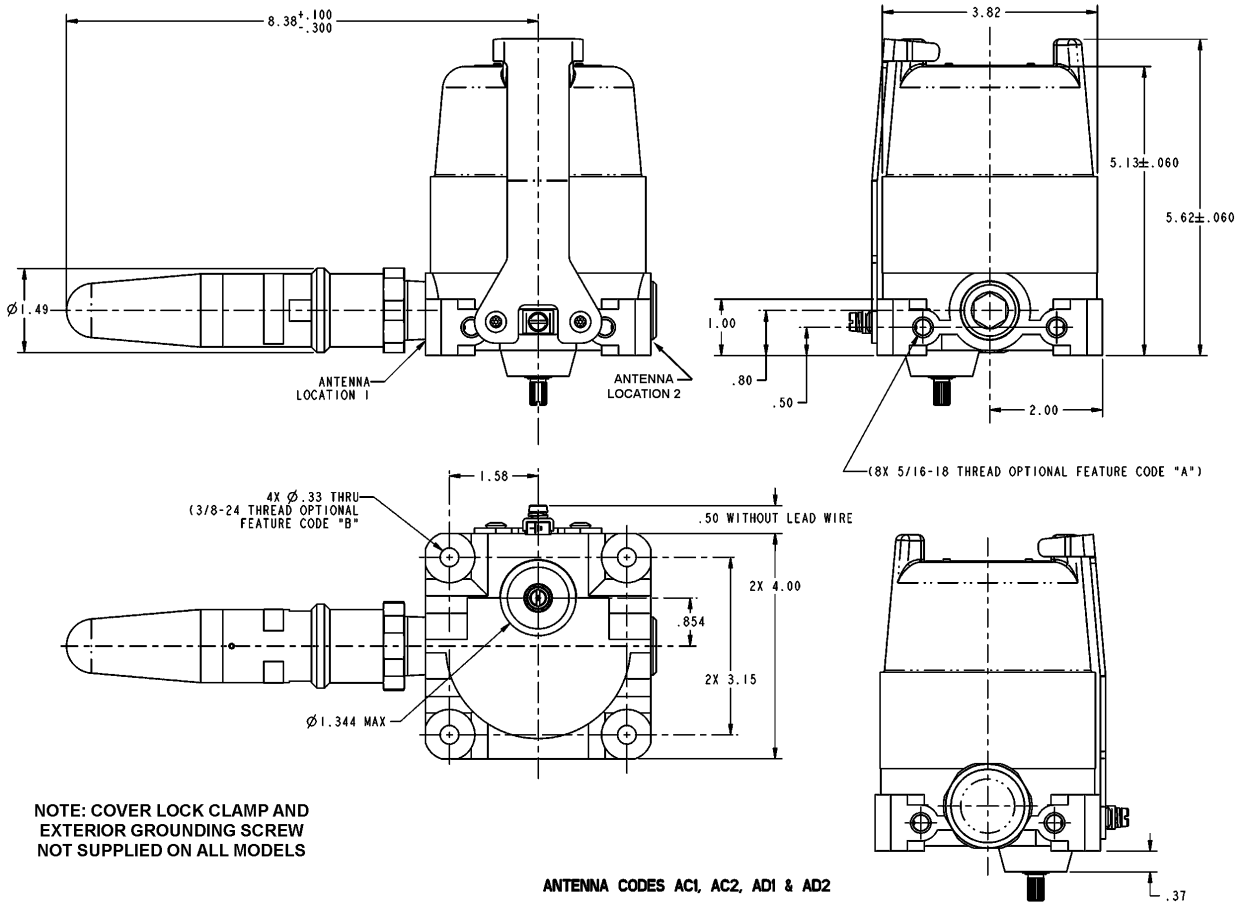

Ø 1.30
4.75 +.100 -.300
.37
ANTENNA LOCATION 1
ANTENNA LOCATION 2
8X 5/16-18 THREAD OPTIONAL FEATURE CODE "A"
1.58
4X Ø.33 THRU (3/8-24 THREAD OPTIONAL FEATURE CODE "B"
.50 WITHOUT LEAD WIRE
.854
2X 4.000
2X 3.150
Ø1.344 MAX
NOTE: COVER LOCK CLAMP AND EXTERIOR GROUNDING SCREW NOT SUPPLIED ON ALL MODELS
ANTENNA CODES AA1, AA2, AB1 & AB2

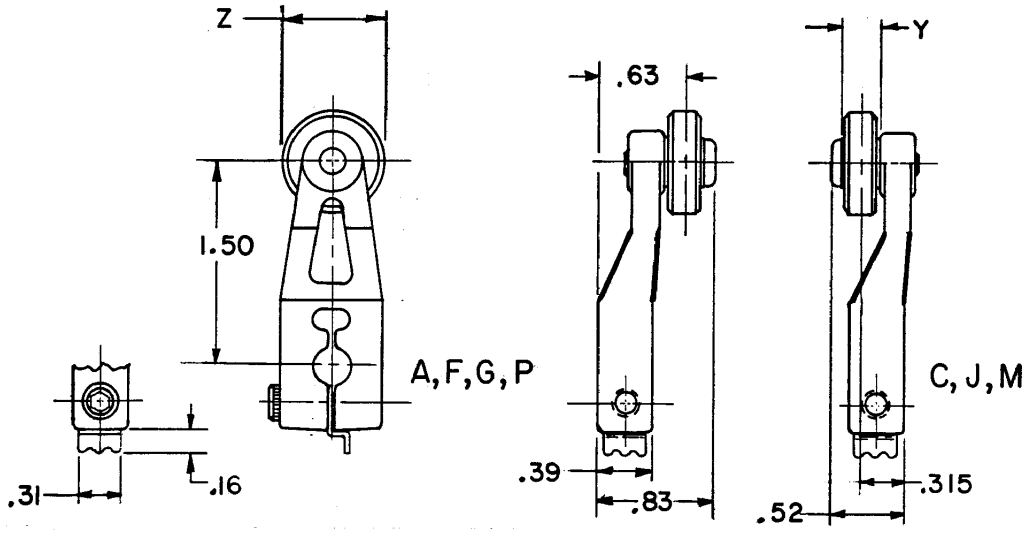
Figure 3. WCX Series valve position sensor straight antenna dimensions



2.3 Actuator Dimensions

The following actuators may be ordered separately.

Figure 4. Standard roller lever actuator

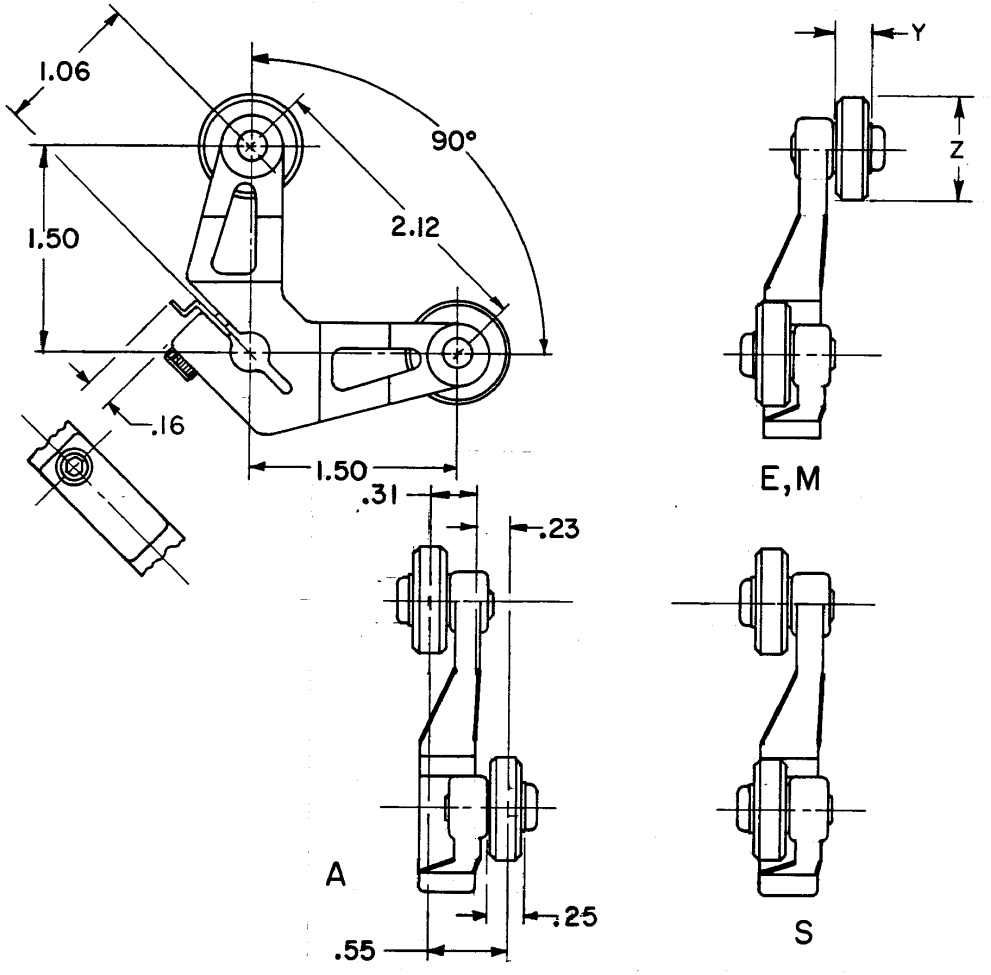


All dimensions for reference only.

All screws are #8-32 with a 9/64 allen head socket.

Honeywell S&C Catalog Listing	Honeywell Process Solutions Catalog Listing	Roller	Z Diameter	Y Width
LSZ51	50051124-002	None	-	-
LSZ51A	50051124-003	Nylon	0.750 in	0.250 in
LSZ51C	50051124-005	Nylon	0.750 in	0.250 in
LSZ51F	50051124-007	Nylon	1.000 in	0.520 in
LSZ51G	50051124-008	Nylon	1.500 in	0.250 in
LSZ51J	50051124-009	Nylon	1.000 in	0.250 in
LSZ51M	50051124-011	Nylon	0.750 in	1.250 in
LSZ51P	50051124-012	Nylon	0.750 in	0.500 in

Figure 5. Yoke Roller Lever

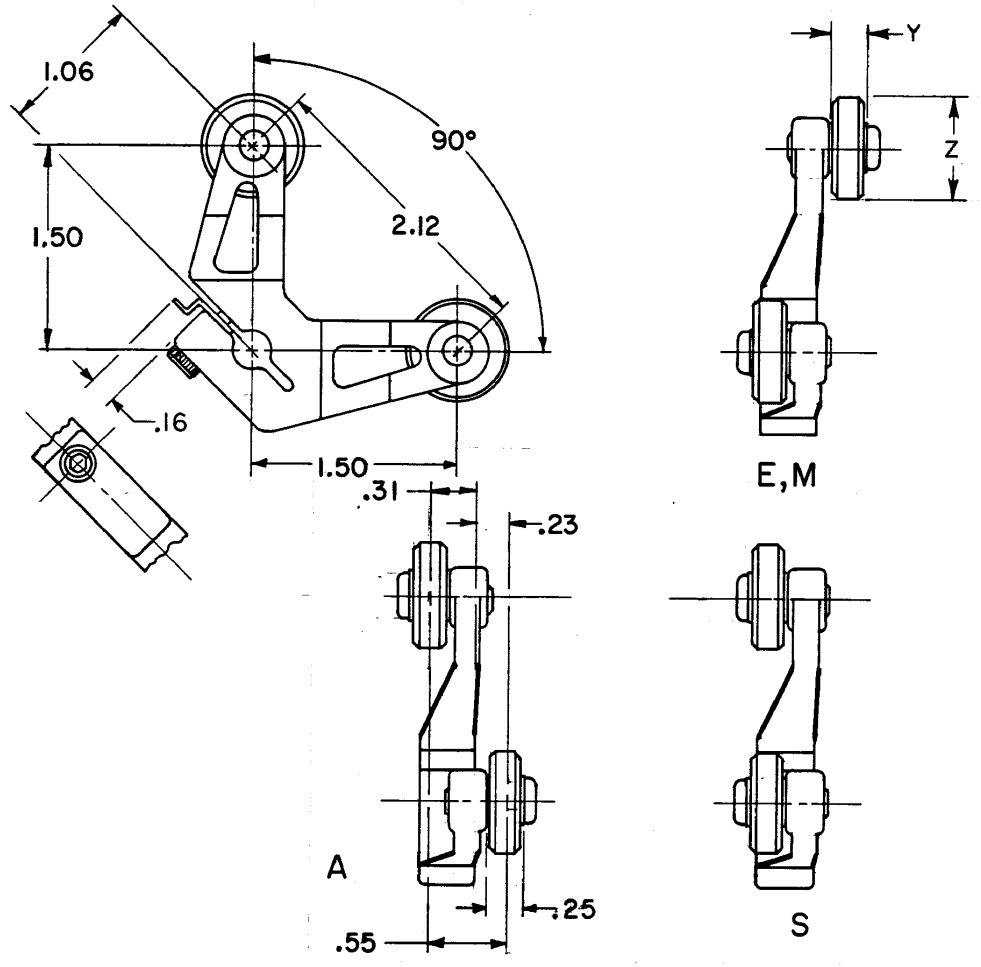


All dimensions for reference only.

All screws are #8-32 with a 9/64 allen head socket.

Honeywell S&C Catalog Listing	Honeywell Process Solutions Catalog Listing	Roller	Z Diameter	Y Width
LSZ53	50051124-019	None	–	–
LSZ53A	50051124-020	Nylon	0.750 in	0.250 in
LSZ53E	50051124-023	Nylon	0.750 in	0.250 in
LSZ53S	50051124-025	Nylon	0.750 in	0.250 in
LSZ53M	50051124-027	Nylon	0.750 in	1.250 in

Figure 6. Offset Roller Lever

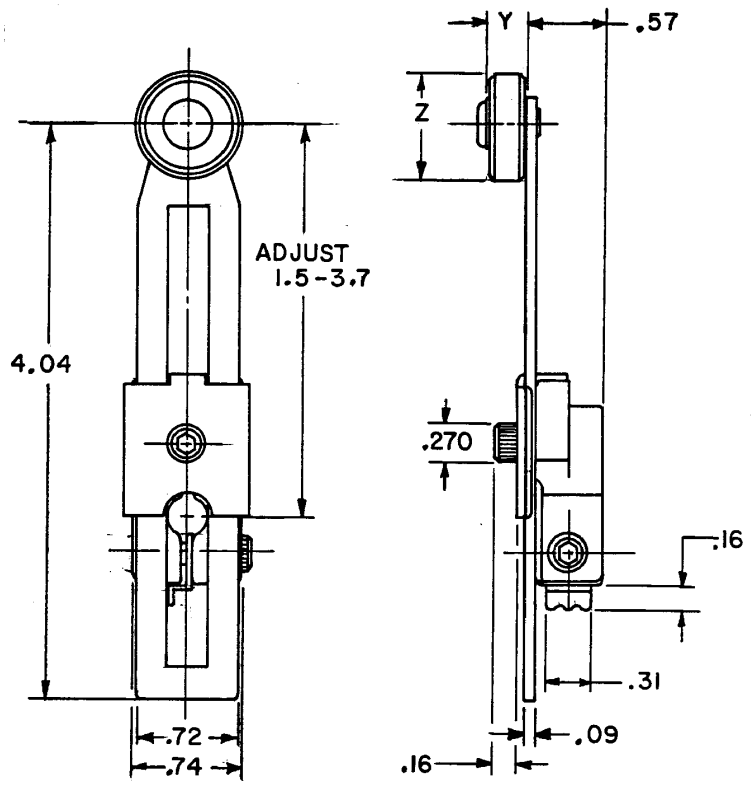


All dimensions for reference only.

All screws are #8-32 with a 9/64 allen head socket.

Honeywell S&C Catalog Listing	Honeywell Process Solutions Catalog Listing	Roller	Z Diameter	Y Width
LSZ55	50051124-068	None	–	–
LSZ55A	50051124-069	Nylon	0.750 in	0.250 in
LSZ55C	50051124-071	Nylon	0.750 in	0.250 in
LSZ55E	50051124-073	Nylon	0.750 in	0.500 in
LSZ55K	50051124-074	Nylon	0.750 in	0.250 in
LSZ55F	50051124-075	Nylon	1.000 in	0.500 in

Figure 7. Adjustable Length Roller Lever

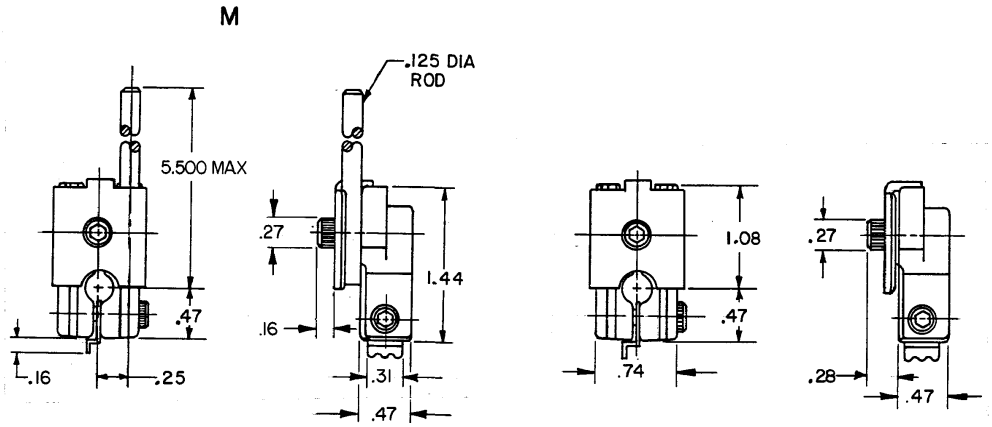


All dimensions for reference only.

All screws are #8-32 with a 9/64 allen head socket.

Honeywell S&C Catalog Listing	Honeywell Process Solutions Catalog Listing	Roller	Z Diameter	Y Width
LSZ52	50051124-028	None	–	–
LSZ52A	50051124-029	Nylon	0.750 in	0.250 in
LSZ52C	50051124-031	Nylon	0.750 in	0.250 in
LSZ52J	50051124-033	Nylon	1.000 in	0.500 in
LSZ52K	50051124-034	Nylon	1.500 in	0.250 in
LSZ52M	50051124-035	Nylon	2.000 in	0.250 in
LSZ52E	50051124-037	Nylon	0.750 in	1.300 in
LSZ52N	50051124-038	Nylon	0.750 in	0.500 in

Figure 8. Rod Lever

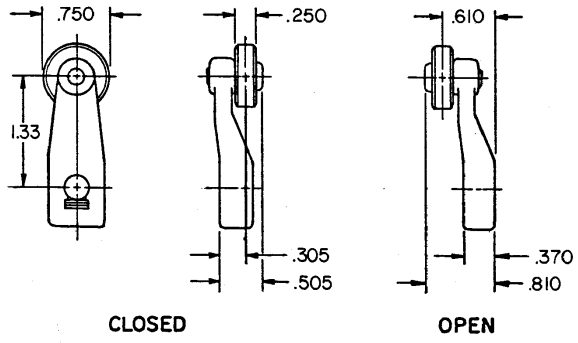


All dimensions for reference only.

All screws are #8-32 with a 9/64 allen head socket.

Honeywell S&C Catalog Listing	Honeywell Process Solutions Catalog Listing	Actuator	Diameter
LSZ54	50051124-049	None (Hub Only)	–
LSZ54M	50051124-041	Aluminum Rod	0.125 in

Figure 9. Short Lever



All dimensions for reference only.

All screws are #8-32 with a 9/64 allen head socket.

Honeywell S&C Catalog Listing	Honeywell Process Solutions Catalog Listing	Roller	Style	Diameter
LSZ59	50051124-053	None	-	-
LSZ59A	50051124-054	Nylon	Open	0.750 in
LSZ59C	50051124-056	Nylon	Closed	0.750 in

2.4 Sensor location

WCX Series Valve Position Sensor models

Process	Suggested location	Explanation
Gases	Above the gas line or gas valve	The condensate drains away from the sensor
Liquids	• Above but close to the elevation of the process valve or other control • Level with the process valve or other control	• The condensate drains away from the sensor • This facilitates a horizontal linkage between valve and sensor

2.5 Bracket mounting

Orientation

The WCX Series sensor may be mounted in any vertical, horizontal or angled orientation. The main consideration is to facilitate coupling of the valve or other device to the input shaft of the sensor.

For best signal, it is generally recommended that the antenna be oriented vertically (see Section 4).

A higher elevation may give better signal range than a lower elevation, depending on obstacles.

Attach sensor to valve

Figure 5 shows an "L" shaped mounting bracket specifically fabricated to allow mounting of the sensor above a valve. Connection of the sensor shaft to valve shaft is done via a “U” shaped bracket, permitting easy manual activation of the valve.

Figure 10. Direct coupling to valve

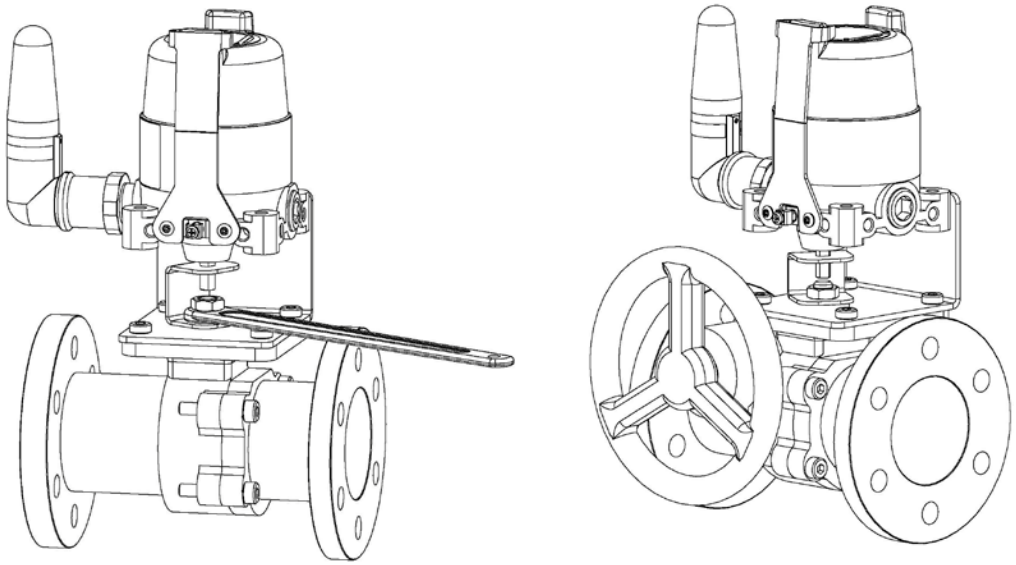


Figure 11 shows a roller lever attached to the sensor shaft that works in conjunction with the valve lever.

Figure 11. Roller Lever

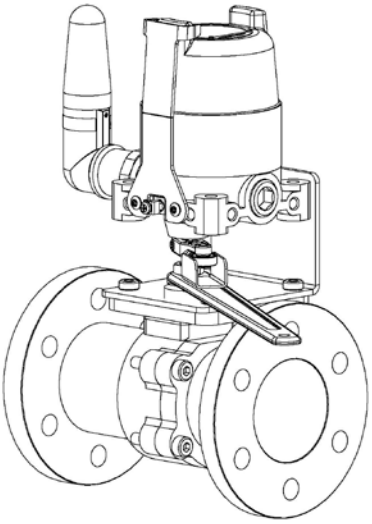
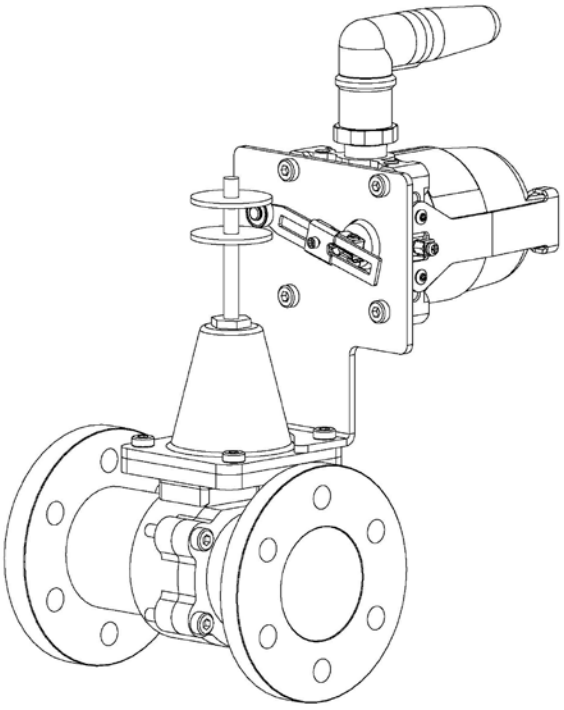


Figure 12 shows sensor connected to a linear valve.

Figure 12. Sensor Mounted to Linear Valve



3. Process Insertion

3.1 Basic Requirements

Non-sparking considerations

To maintain non-sparking characteristics, non-sparking linkages, actuators and hardware are required.

Distance from multinode

The maximum range of the WCX Series sensor system is 1000 ft [305 m], under ideal conditions, with a clear line of sight. This will be reduced if the signal has to pass through dense materials such as brick, concrete, or wood. Metal objects, tanks, pipes, or other structures, will not pass signals, however signals will tend to reflect off metallic objects, such that clear line of sight may not be essential.

Angle to be measured

The angle input to the sensor input shaft must be no greater than approximately 270 degrees. If the input linkage used applies an angular movement greater than this, proper calibration will not be possible. Angular motion beyond 270 degrees will engage the slip clutch within the product.

Sensor update rate

The maximum update rate possible is one measurement and update per second. Insure that the update rate chosen will capture all necessary events when the monitored device is moving at its fastest speed. The rate of data updates may be set through wireless builder. The update rate cannot be set locally using the IR port. If the factory default update rate is not suitable for the application, it should be changed through wireless builder. Note that the default refresh rate is factory set to one per 30 seconds to maximize battery life. Battery life will be affected by the update rate selected; faster rates will decrease battery life.

Access to cover for configuring sensor, changing batteries

Configuring and calibrating will require access to the top of the sensor. Allow room for cover removal and for a clear view of the IR sensing element (see WCX Series Sensor User's Manual).

Replacement of internal batteries will require removing the cover, and partial removal of a battery assembly. Allow clearance for this (see WCX Series Sensor User's Manual).

Honeywell recommends that the sensor be removed from service and moved to a clean area before servicing. Use care to avoid rotating the input shaft, causing the internal slip clutch to slip.

Proximity to high powered L-band transmitters

The WCX Series sensor system operates in the 2.4 Ghz. frequency band using an encrypted, spread-spectrum data modulation, with very high immunity to interference from other signals. Other devices using low powered signals in this frequency range are some cordless telephones, personal computer WI-FI links and routers, and video/audio remote transmission links. These are highly unlikely to cause any signal overloading problems and thus, de-sensitization of the data link (low signal).

However, some high-powered microwave heating devices may operate with 1,000 watts or more, and may operated in nearby frequency bands. While likelihood of interference is very small, it is best to avoid locating sensors or multinodes in very close proximity to such devices.

3.2 Linkage Alignment

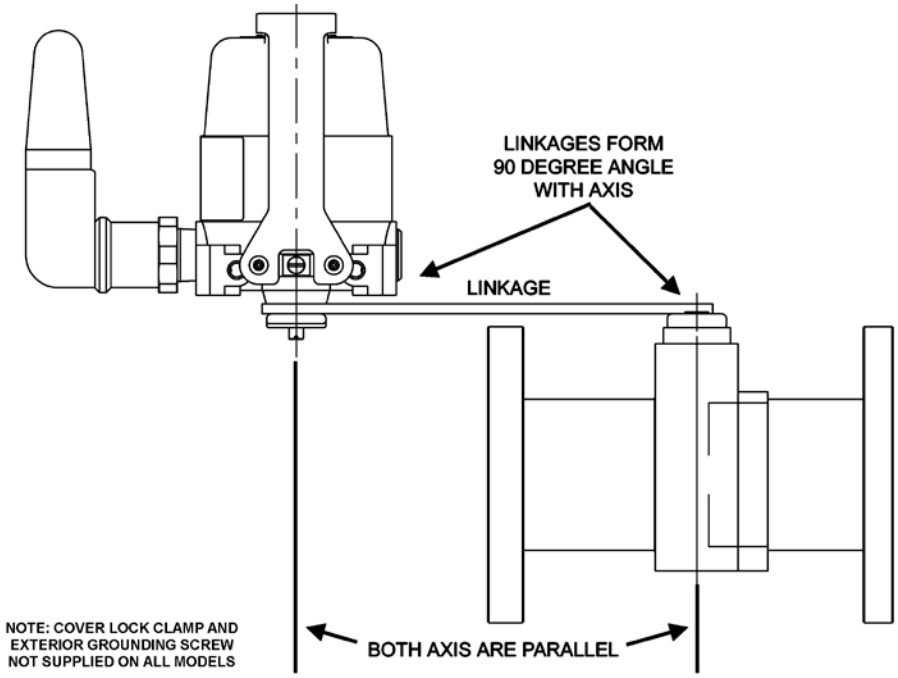
Axis of valve and sensor input shaft

To allow smooth rotation, the axis of the valve or device must be parallel to the centerline of the sensor input shaft, unless a flexible form of linkage (cables or ball joints) is used.

Alignment of linkage

If cables or ball joint couplings are not used, the linkage used must form a 90 degree angle with the sensor input shaft and the valve shaft.

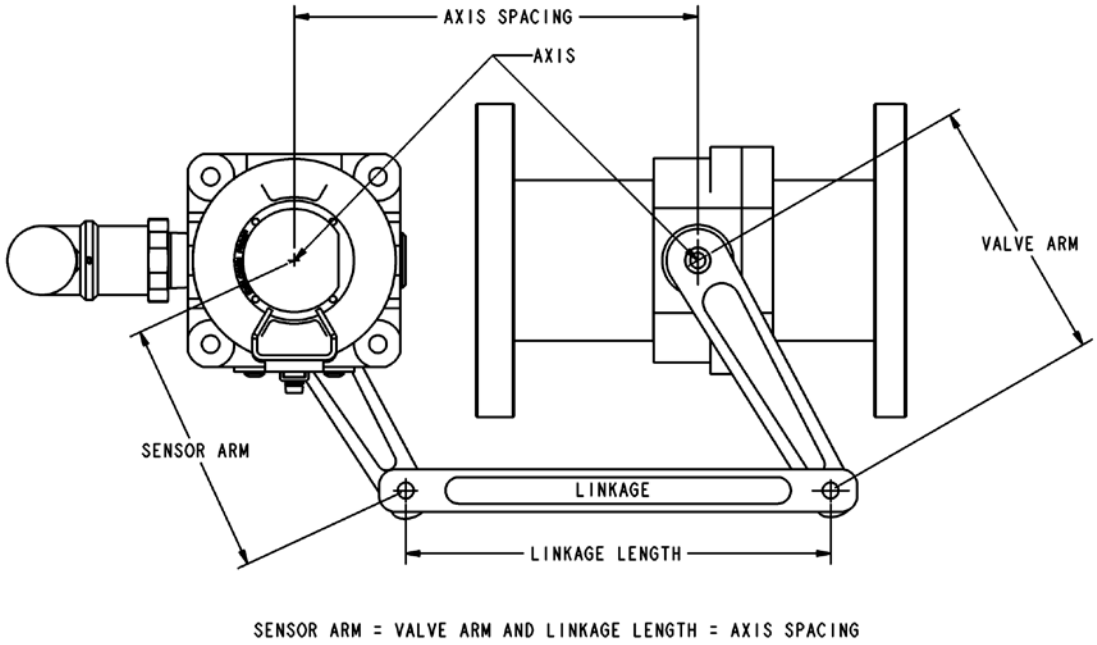
Figure 13. Axis parallel and linkage 90 degrees with shafts



If angle linearity is required

If the angle measurement must be linear (end points and all points between must be measured accurately), then the sensor arm, valve arm, shaft-to-shaft spacing, and the linkage length must form a parallelogram (see Figure 14).

Figure 14. Parallelogram Formed by Linkage



A second alternative method for achieving measurement linearity would be to mount the sensor directly above the valve shaft (see Section 2.4).

Coupling with pulleys

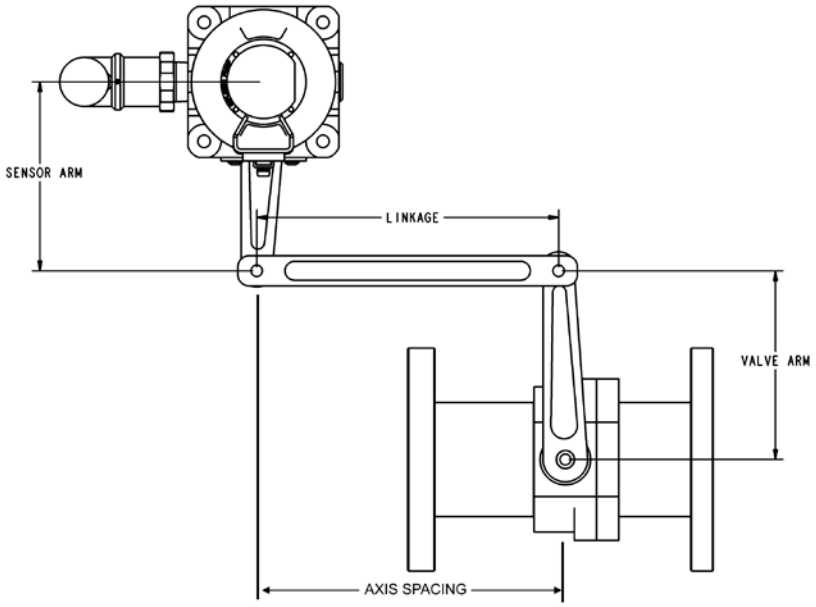
Instead of linkages, two small pulleys with steel cable could couple the two shafts. A means of maintaining cable tension would be needed. By using two different pulley diameters, angles of greater than 270 degrees could be measured, or a small angle could be measured to greater precision. With equal sized pulleys, the measured angle would be equal to the valve angle. With unequal sized pulleys, the measured angle would be as follows:

MEASURED ANGLE = VALVE ANGLE * (VALVE PULLEY DIAMETER / SENSOR PULLEY DIAMETER)

If clockwise is to be translated into counter clockwise

If, due to measurement requirements, the clockwise rotation of an actuator or other device is to be sensed as counterclockwise rotation, the linkage may be configured to do so. Note that angle measurement linearity may be achieved if the dimensions are controlled as previously described.

Figure 15. Changing CW into CCW



If an angle greater than 270 degrees is to be measured, the length of the valve arm may be reduced. If a small angle is to be measured with greater precision, the length of the valve arm may be increased. Note that these two options will make actual angle measurements non-linear.

3.3 Non-Valve Applications

Door position sensing

By positioning the WCX Series sensor above a door with the shaft axis vertical, above the hinges, a short linkage could sense the amount of door opening. The low cal. position could be full closed and the high cal. position could be full open. Note that this would not be suitable for intrusion detection as a very fast open/close cycle could be shorter than the maximum update rate from the sensor (1 second intervals).

Air handler plenum door position sensing

Similar to door position sensing, the sensing of air handler status could be monitored. The sensor could be mounted with the sensor shaft directly coupled to the plenum valve shaft.

Linear displacement

Adding a lightweight pulley with thin wire rope to the sensor input shaft would allow conversion of linear displacement to a measured angle. The diameter of the pulley would determine the sensitivity and range of the measurement.

Note that stops would be advised to prevent the sensor input shaft angle from exceeding the 270 degree limit.

4. Antenna Adjustment and Mounting

4.1 Requirements

Radio installation requirements

ATTENTION

Professional Installation is required to insure conformity with Federal Communications Commission (FCC) in the USA, Industry Canada (IC) in Canada and the Radio and Telecommunications Terminal Equipment Directive, 1999/5/EC (R&TTE), in the European Union (EU).

Professional installation is required for the selection and installation of approved antennas and setup of the maximum allowable radiated power from the WCX Series Valve Position Sensor as configured for the particular installation site.

The antennae used for this sensor must be installed to provide a separation distance of at least 20 cm (8 inches) from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

For remote antenna, see antenna installation requirements to satisfy FCC RF exposure requirements.

ATTENTION

Federal Communications Commission (FCC):

The WCX Series Valve Position Sensors comply with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada (IC):

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF fields in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's web site www.hc-sc.gc.ca/rpb.

4.2 Integral antenna

WARNING

POTENTIAL ELECTROSTATIC CHARGING HAZARD

The integrally mounted antenna shroud is made of Teflon® and has a surface resistance greater than 1Gohm per square. When the WCX Series Valve Position Sensor is installed in potentially hazardous locations care should be taken not to electrostatically charge the surface of the antenna shroud by rubbing the surface with a cloth, or cleaning the surface with a solvent. If electrostatically charged, discharge of the antenna shroud to a person or a tool could possibly ignite a surrounding hazardous atmosphere.

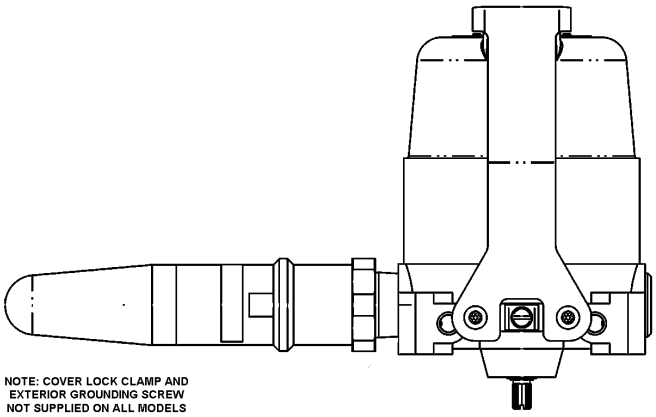
Elbow

Figure 16. Elbow antenna adjustment

If your model has the integral elbow antenna you can adjust it to improve reception. The least signal radiation is in a direction in line with the top (pointed end), so it is best to avoid having the antenna pointed directly toward, or directly away from, the multinode. Typically, pointed straight up gives best performance but your installation may vary. Loosen the 1,5mm [approx. 1/16 in] set screw located near the antenna base. Rotate antenna for best reception. Do not rotate antenna more than 180 degrees either direction or the internal antenna cable could be damaged. Tighten set screw.

Straight

Figure 17. Integral straight antenna



If your model has the integral straight antenna you can adjust its position by rotating the sensor housing. (See Section 2). Typically, pointed straight up gives best performance but your installation may vary.

5. Start Up

5.1 Connect batteries

⚠ WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

Connection and disconnection of the batteries should only be performed in a non-hazardous area.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

If sensor is to be returned to Honeywell for any reason, both batteries MUST be removed prior to shipping.

Dispose of used batteries promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not dispose of in fire.

Failure to comply with these instructions could result in death or serious injury.

ATTENTION

Both batteries must be the same model from the same manufacturer. Mixing old and new batteries or different manufacturers is not permitted.

Use only the following 3.6V lithium thionyl chloride (Li-SOCl2) batteries (non-rechargeable), size C. No other batteries are approved for use in WCX Series Valve Position Sensors.

- Xeno Energy XL-145F
- Tadiran TL-5920/S

Table 1. Battery connecting procedure (For item numbers, refer to Figures 11 and 12)

Step	Action
1	If applicable, remove two T-15 TORX screws (1) and cover lock clamp (2).
2	If necessary, place a large screwdriver or other flat tool across the two tabs on the cover (3). Unscrew and remove the cover.
3	Using two fingers, press down slightly on both battery tops (4) and remove battery insulator (5). Insure that the batteries are properly seated and making good contact.
4	Replace cover, tightening hand tight. If applicable, replace cover lock clamp (2) and two T-15 TORX screws (1).

Figure 18. Battery connecting

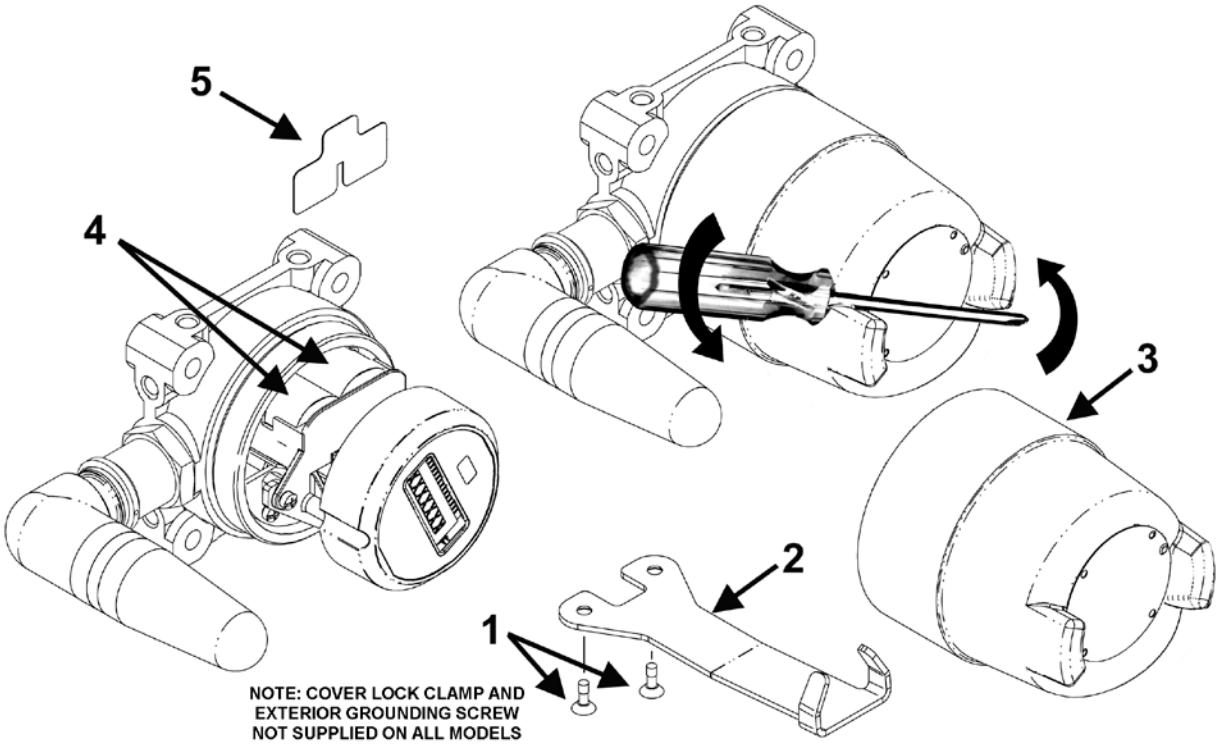
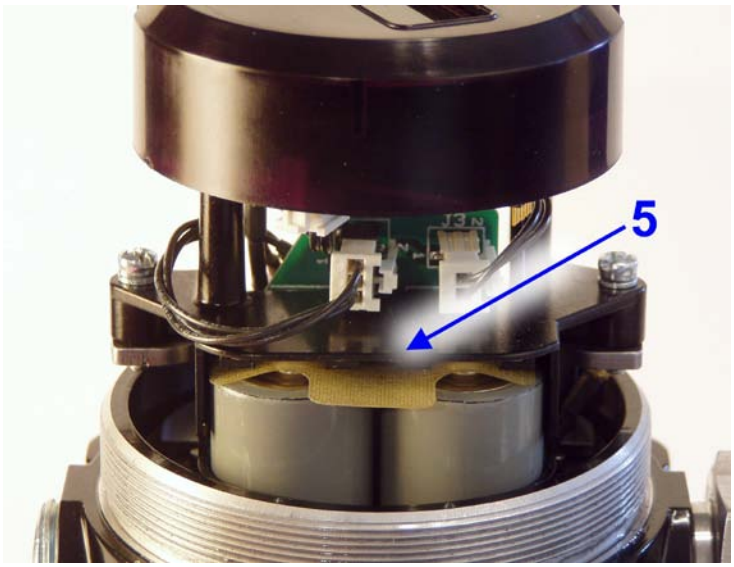


Figure 19. Battery connecting detail



5.2 Display sequence

After power up, the sensor does a brief self-test of the LCD display. Then it proceeds to power-on message, which is the model name of the sensor. The name is displayed for 2 seconds after which the sensor displays the process variables and associated status.

5.3 Authentication

Before the sensor can be configured it must be unlocked with a security key so it can join the network. Use the Authentication Device Pocket PC software to receive security keys from the Key Server manager, then aim the Pocket PC at the sensor and transmit a key.

See Getting Started with Honeywell OneWireless™ Solutions for more information.

5.4 Calibration

See the WCX Series Sensor User's Manual for calibration procedures.

6. Installation Drawings

6.1 Drawing Availability

Complete installation drawings for each p/n of WCX Series sensor are available from Honeywell.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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